Entrepreneurship Education: Towards an Industry Sector Approach

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Abstract

Purpose – This paper considers the requirements for an industry sector approach to entrepreneurship education – The Information and Communications Technology (ICT) Sector. We present a modified Process Framework for Entrepreneurship Education focusing specifically on ICT. The primary components of the Process Framework are described (inputs, process and content, assessment and outputs) to assist in the design of relevant and targeted entrepreneurship education courses to create an entrepreneurial mindset for graduates in this sector. This Framework can be modified to suit courses focusing on other industry sectors.

Methodology – Based on experiential learning and industry sector knowledge of the authors, they modify an existing Process Framework for Entrepreneurship Education.

Findings – The Process Framework for Entrepreneurship Education can be modified for a specific sector. Inputs to the process include the personal profiles and personality characteristics of the students. The recognition that particular skills may be required within a sector should be catered for when developing the content focus of the process. Furthermore, the teaching focus should include action learning, problem based learning and discovery teaching. Consideration of all of these elements will help ensure that the entrepreneurship teaching process will develop entrepreneurial-focused students within the sector.

Entrepreneurship education is a flexible learning mode easily modified to accommodate changing workplace and employee needs. The use of the process framework provides for a set of useful and relevant guidelines on the key aspects which should be addressed and used as a checklist in attempting to modify and design suitable and relevant entrepreneurship education programmes for specific industry sectors.

Practical Implications – This paper is aimed mainly at the educator, as it focuses on the educational process for entrepreneurship. It strongly focuses on the need of the ICT student as a stakeholder in the entrepreneurship education process. Educators need to consider its efficient implementation to ensure that sufficient depth of material can be covered. It also presents issues and challenges for educators in the design and delivery of customised and targeted entrepreneurship programmes. It provides a template for modification within other subject disciplines.

Originality /Value of research – This paper demonstrates that educators need to consider entrepreneurship for industry sectors, thus presenting the requirement for an inter-disciplinary approach to entrepreneurship. It does so through the refinement of an existing Process Framework for Entrepreneurship Education, taking the specific

example of Information and Communications Technology. While the framework can be modified for use in other sectors, this paper presents the integration of and highlights the synergy that exists in the linking of entrepreneurship with the technical disciplines.

Article Type: Research Paper

Keywords: Entrepreneurship Education; Information and Communications Technology (ICT), ICT Sector, Process Framework

Introduction

In Ireland, as in other countries, the economic landscape is changing, with a move from foreign direct investment to self-employment and entrepreneurship. This is noted in the increase in the number of individuals considering self employment as a career option. Analysing the levels of enterprising activity in Ireland, the Global Entrepreneurship Monitor (2005) report found that Ireland remains one of the leading countries in Europe in terms of entrepreneurship. This country is fast approaching the levels of early stage entrepreneurial activity prevalent in the U.S.A., which is well recognised for innovation and new ideas. The number of individuals starting and planning new businesses increased to 9.8% up from 7.7% in 2004 which is equivalent to almost a quarter of a million individuals in 2005. Furthermore, the report also suggested that there is an increase in the proportion of the population in the 25-44 age group considering entrepreneurial activity. Ireland has almost a quarter of its population in this age group – therefore, these statistics are encouraging and suggest a good source of potential entrepreneurs which should be harnessed.

According to The Business Forum (2006) there are approximately 250,000 small firms in Ireland (inclusive of both manufacturing and service firms). These firms account for more than 99% of all enterprises in the State and contribute to 68.4% of private sector employment. Ireland is now ranked no. 1 in the world in terms of cultural perception of entrepreneurship (GEM, 2005). Almost 70% of people consider entrepreneurship to be a good career choice. This reinforces the need to create a positive disposition towards entrepreneurship together with a highly responsive environment to the needs of enterprise at a national and local level. One mechanism to do this is through the provision of general and more industry-specific entrepreneurship programmes.

Entrepreneurship Education

In Hynes and Richardson (2007), we discussed the importance of linkages between the small firm and the University sector to improve the quality and relevance of entrepreneurship education. Doing so gives benefits to a variety of stakeholders – to students, faculty, educational institutions and small firm owner/managers. We demonstrated how courses can be set up to ensure that these benefits materialise to all stakeholders.

The effective implementation of such courses is important to cater for entrepreneurship and its continued growth. However, given the importance of specific industry sectors to the economy, we argue that the entrepreneurship education should not always be considered in isolation or in a generic sense. Educationalists

should be aware that as the needs of a particular industry sector change, education should change. To do so ensures that entrepreneurship education focuses on areas which are relevant for industry and for economic growth. It also allows the educator to focus on real-world issues which arise. This is becoming increasingly important and we must be prepared to modify our courses to cope with changing economic landscapes. In fact, industry sector specific entrepreneurship programmes exist internationally (see, for example, Nottingham University Business School, 2007).

In this paper we focus on the Information and Communications Technology as one sector which should be considered.

Why the ICT Sector?

In Ireland, Information and Communications Technology (ICT) is a growth sector which has been recognised strategically by Government as important to our economy. The success of the growth of this sector in Ireland is attributed to a number of factors which include low corporation tax, an English speaking workforce, the availability of a highly qualified and educated workforce, a strong indigenous firm base and deployment of EU structural and cohesion funds to Ireland (Enterprise Ireland, 2004, Forfás, 2004, Trauth, 2000). Between 2004-2005, revenue in this sector grew by 29%, while the growth rate of exports was 24%. Within this sector, in software alone, there are 760 indigenous companies employing over 11,100 people. The indigenous software sector provides 47% of employment in the Irish software sector (Enterprise Ireland, 2007).

Global Enterprise Monitor (2003) and Forfás (2004) have suggested a need to increase resources thus building a more self-sufficient indigenous industrial base to reduce the reliance on FDI. Furthermore, Forfás (2004) indicated that the ICT sector in Ireland is one of those critical to the continued success of the economy. Current government initiatives are focusing on the establishment and growth of indigenous firms in the sector and how a greater level of enterprising activity can be achieved (Gallen, 2004).

Educators, including universities, "have an obligation to meet students' expectations with regard to preparation for the economy in which they will operate" (Galloway, et al., 2005). The industrial sector has to cope with flexibility and responsiveness and it is incumbent on the educational system to demonstrate the same traits (Expert Group on Future Skills Needs, 2004). Therefore, educationalists need to be cognisant of entrepreneurship requirements for the ICT sector.

Requirements of the ICT graduate

While the ICT graduate needs to demonstrate academic ability, the modern ICT graduate operates in a changing business environment. Here, they need to work in tandem with non-technical groups. Therefore, there is a need for greater business awareness and a more holistic understanding of the interchange of relationships that need to occur within a firm. This helps to ensure success of ICT ideas in the market place.

The needs of the ICT student can be grouped as follows (Expert Group on Future Skills Need, 2004):

- Practical Experience, Flexibility/Innovation Skills

- Management Skills for the 21st Century
- IT Skills
- Generic Skills

Practical Experience, Project-based and Flexibility/Innovation Skills

Industry is increasingly looking to recruit graduates with practical work experience and commercial understanding. As a result, students with strong technical abilities but little practical experience are losing out on potential jobs. Education courses need to foster adaptability, flexibility, and innovation skills which must become integral to the education system at all levels if the needs of a changing workforce are to be met. For example, the introduction and expansion of project-based learning will help to provide these skills. By moving in this direction, there is significant scope to improve both the quality of learning and the development of soft skills relevant to the workplace without compromising the intellectual content of courses.

Management Skills for the 21st Century

Management skills to include decision making, risk taking, managing change and people management have become increasingly important to national economic development. Therefore, we need to ensure that students are well equipped in these necessary management skills. In particular, when we focus on innovation and entrepreneurship, the need to ensure technology transfer from the research lab into the commercial arena requires specialised management expertise such as the management of technology transfer and intellectual property.

Information Technology Skills

Given the rapid diffusion of computing technologies into the business and domestic markets, there has been a huge increase in the number of jobs involving the use of information technology (IT). This has resulted in IT skills[1] and the use of desktop packages such as word processing, spreadsheet and database packages becoming increasingly important. Workforce IT skills are becoming one of the most important factors affecting business competitiveness. Such skills which are used across all levels in organizations including management levels are increasingly viewed by employers as a basic requirement.

Generic Skills

The greater prominence of high-tech manufacturing, internationally traded services and research and development activities in Ireland's economy require high standards of generic skills, to complement academic or vocational ones. Generic skills include basic skills such as literacy and numeracy, and also key skills such as communication, team working, planning, problem solving, and customer service handling. Furthermore, research indicates that an increased number of people are working in professional and managerial occupations and that the importance of skills such as communication and planning is growing.

[1] We want to clearly distinguish between IT skills and ICT education. IT skills include desktop packages as mentioned in this section. ICT education is the education of graduates in subjects such as software engineering, computer science and computer engineering.

ICT Graduates in Industry

It is clear that industry requires an ICT graduate who is not just trained as a subject matter expert from a theoretical perspective. There is a definite need for graduates to have skills which are based on the ability to approach work from a flexible, creative and innovative viewpoint. It is necessary that graduates are able to perform as a member of a team and have important people management skills.

Our experience of the ICT student is that they generally expect to go into paid employment working in a technical position in an existing organisation, with a small minority giving consideration to starting their own company. Given the requirement for the Irish economy to develop and sustain indigenous industry, we are concerned at the limited exposure ICT students have to entrepreneurship. Their University education should present them with the entrepreneurship option which they may not have been presented with in their prior educational and social experiences.

Entrepreneurship Education – Responding to the needs of the ICT marketplace

DeFaoite et al. (2003) found that entrepreneurship education provided for the integration of a variety of business subjects, the promotion of improved decision making skills and an increase in technology transfer between universities and the market place. The need to broaden enterprise education outwards from business schools has also been endorsed by the European Commission (Europa, 2003) and Galloway and Brown (2002). Galloway and Brown (2002) also suggested that a "cross disciplinary approach" to enterprise education could influence a range of industry sectors including the arts, science and technology disciplines. Furthermore, Hytti and O'Gorman (2004) found that the more successful courses were those which integrated learning across the general educational experience and which introduced enterprise education into other courses. The innate abilities of an individual, coupled with the overall socio-economic environment (ease of establishing a new business, access to finance and advice as well as the prevailing cultural attitudes to entrepreneurship) are extremely important factors in determining whether they pursue an entrepreneurial path. These innate abilities can be greatly enhanced by education and training.

Process Framework for ICT Entrepreneurship Education

In an evaluation of entrepreneurship courses at third level Hynes (1996) demonstrated that entrepreneurship education is process driven. Stakeholders in this process have a range of needs which may differ in nature and scope. This results in the need for a flexible approach to course design and delivery. Essentially the process consists of three key elements, inputs, process and outputs. The inputs refer to the profile and characteristics of the student. The process consists of two constituents that reflect the content and teaching methods adopted to suit the characteristics, objectives and requirements of the inputs. Finally the outputs reflect the "take away" element of the course - the resulting increase in knowledge and skills the participants obtain from the course and the added value accrued to the host institution delivering the course.

One of the benefits of the framework is that it is flexible and encourages adaptation to suit both the participant needs and the demands of the workplace. The adaptation presented in this paper is the inclusion of entrepreneurship for ICT.

Inputs	Process		Outputs
Students profile and characteristics	**Content Focus**	**Teaching Focus**	**Professional / Technological**
Prior knowledge base Motivation/Attitudes Personality Needs/interests Level of Independence Attitudes Parent influence Self-esteem Values(work and personal Work experience Gender	**ICT** (Science, Mathematics, Programming, ICT Design, Development process) **Entrepreneurship Content** (Entrepreneurship, Entrepreneurship, Innovation, New Product Development, Innovation, Idea Generation, Research and Development) **Business Content** (Marketing, Accounting & Finance, Human Resources) Legal Aspects (Intellectual Property Rights, Employment legislation, Insurance) Competency/ Soft skills Development Interpersonal Skills (Communication, Presentation, Writing)	Didactic (reading/lectures) Skill building (case studies, group discussions, presentations, problem solving, simulations, teamwork, projects) Discovery (brainstorming, personal goalsetting, career planning, consultancy)	Personal (confidence communication) Knowledge (enterprise, initiative, self-employment, business, management and market skills, analytical, problem solving, decision making, communication, presentation, risk taking) Confidence Greater self awareness Career (improved knowledge, broader career options, broader less structured career perspectives).

Figure 1. Process Framework for Information and Communications Technology Entrepreneurship Education (Adapted from Hynes, 2006)

Course Objectives

In ICT Entrepreneurship Education there is a need to incorporate both discrete quantifiable objectives and less specific but more individual behavioural related objectives. Using the framework, the resulting course will provide students with a theoretical and practical foundation in the concepts and principles of effective management practices as they apply to the small firm. Furthermore, it will enable students to build on their practical experience and develop the skills and competencies to apply where applicable the principles of management.

Inputs

Before the content or teaching focus is finally decided upon, it is important to define the personal profile and personality characteristics of the students ("inputs"). It is at the input stage that many of the needs of the workplace can be accounted for and accommodated in the content, teaching and delivery process. As most groups are heterogeneous in nature characterised by different levels of knowledge, awareness, interests and career aspirations, a useful method of ensuring this detail is collected is through the completion of an "entry questionnaire" or "entrepreneurial self

assessment questionnaire". This assists the students to determine their own levels of self-awareness and interest in both disciplines which they are studying.

Process

The elements of the design, delivery and evaluation of the various courses are devised by taking the characteristics of the students and the broader external needs of the ICT sector as a baseline. While these can be dealt with separately, it is important that they are also integrated to ensure that the objective(s) is achieved. Decisions on one of the stages will impact and influence the other. For the Process Framework emphasis is placed on how provision is made to both content and delivery to address the skills needs of the ICT student and how they align the relationship between entrepreneurship and the technical aspects of their course.

Content Focus

While content and teaching can be dealt with separately, it is important that they are also integrated to ensure that objectives are achieved. Decisions on one of the stages will impact and influence the other.

ICT Subject Focus

The process framework includes Information Technology Content (Figure 1). The content focus presented provides students with an understanding of ICT topics and of the stages of the entrepreneurial process in a holistic manner to highlight the synergies that exist between both areas. There are a set of skills with which we expect the ICT student to graduate with. For example, they should possess basic skills such as programming and design, specialist skills such as computer graphics and modern developments such as bioinformatics. Depending on the focus within ICT courses, different skills will be taught. What is important is that the content of such a course is given due consideration, and that the graduate is provided with the correct mix of skills which can introduce them, in this case, to the entrepreneurship labour market.

Entrepreneurship subject focus

Entrepreneurship and innovation should be presented in tandem with the ICT content. Key topics here include introducing students to the theory and practice of entrepreneurial creativity and innovation, providing an understanding of the nature of entrepreneurship and the characteristics of the entrepreneur. As there is an applied emphasis on the topic, students must be encouraged to generate a number of business ideas. The ideas should be as practical as possible and related to market and business opportunities in the ICT or related industry sectors and students should be required to present a business plan.

Other 'content focus' topics, such as marketing, accounting and finance and human resources, often not associated with the study of ICT, will add value to the knowledge of necessary business subject areas. They will also develop the skills base to encourage more enterprising behaviour and have gained a more integrated and holistic business management perspective.

Soft Skills-content focus

Graduates from ICT Entrepreneurship education need to have soft skills such as communication, presentation and writing skills. As entrepreneurs, they need to be

able to present themselves effectively with the business community around them, while also being capable of marketing their product potential/service to customers.

The challenge for us as educators is to provide graduates with content focus, while ensuring that the breadth of the subject does not cause the depth to be eroded. This is ensured by adopting multiple flexible delivery methods in our teaching.

Teaching Focus

Traditional lecture driven teaching methodologies are not relevant to entrepreneurship courses, as they may inhibit the development of entrepreneurial skills and characteristics (Kirby, 2002). The role of the educationalist moves from the traditional "sage on the stage" to becoming a "guide on the side" (Hannon, 2005). The educationalist needs to adopt the role of coach, mentor, and challenger and have the ability to provide feedback in a constructive and relevant manner. In Hynes and Richardson (2007), the courses which we presented require this adoption to happen. In these cases, demonstrable benefits were gained by all groups of stakeholders.

The teaching process should focus on active learning, problem based learning and discovery teaching. Active learning places greater emphasis on the student exploring their own skill, competencies and general self-awareness. In a problem-based learning environment, either on their own or in teams, students assume responsibility for solving problems. Discovery teaching provides students with a learning environment which will equip them with the ability to continue educating themselves throughout their career. Essentially the combination of these approaches provides students with personal and career development. Furthermore, role models, guest speakers and case studies can encourage skills development such as self-efficacy confidence, initiative, and problem-solving skills.

Delivery of entrepreneurship courses is often primarily dependent on a few key faculty members. These faculty members need to be equipped to deliver courses, which are often less lecture driven, less theoretical and require a level of entrepreneurial behaviour. Research by Hytti and O'Gorman (2004) in a comparative study of entrepreneurship courses across a number of countries (Ireland being one), found that the trainers lacked the skills and information required about entrepreneurship to provide students with the necessary skills and knowledge for entrepreneurship education. They recommended the need for in-career training to support and address the needs of the trainers to ensure they are better equipped. A recommendation for team teaching or joint input on course design and development by the ICT and the business faculty can alleviate these concerns.

Teaching focus and Content focus - Creating the links

One of the difficulties experienced by ICT educators is the changing pace of technology. Therefore, we need to ensure that students are not only equipped with the 'current' ICT knowledge base at time of graduation, but furthermore, are equipped with the skills to update their knowledge as required. To tell them about current trends and knowledge can be done through didactic teaching. The incorporation of action learning, problem based learning and discovery teaching allows them to develop their knowledge and skills. It is not enough, for example, for the student to be shown how to write a program – they must experience writing a program for themselves before they can really understand how to do this correctly.

The combination of content and teaching focus can provide students with an understanding of the stages of the entrepreneurial process. The process focus should combine both formal and informal teaching methods, encouraging topics such as problem solving and career planning in an interactive action based learning environment.

Outputs

Robertson et al. (2003) stated that assessment and examination form the basis of how well the student has utilized time and resources available to them to accomplish the objectives of the course studied. Conventionally, at third level, a final examination – which is generally theory based - forms the primary component of assessment. Gibb (1996) and Henry et al. (2003) suggest that entrepreneurship education does not fit neatly into these models of assessment of the traditional examination. Assessment methods need to mirror the objectives of the ICT entrepreneurship courses and also accommodate the different non-traditional teaching and delivery methods discussed above.

Discussion

We argue in agreement with GEM (2005), Forfas (2004) and Small Business Forum (2005) that entrepreneurship education is critical to create awareness of, and expose the potential for, self employment as a career option. However, in order for entrepreneurship education programmes to be effective there is a need to move beyond the provision of a generic or "one fits all" type of programme to increase access across disciplines in a user friendly and targeted manner.

This need is reinforced in research findings of Global Enterprise Monitor (2003) and Forfás (2004) who suggested a need to increase resources to build a more self-sufficient indigenous industrial base to reduce the reliance on FDI. In Ireland, government industrial policy emphasizes the development of sectors such as ICT, Food and Internationally-Traded Services which have growth potential in added-value service and product areas in a global market. Focus on these sectors will provide the country with a small firm sector that is capable of responding to the changing needs of growth in a national and global context. We suggest that the continued creation and increase in the number of new firms established on its own is not an indicator of a positive small firm sector. A sustainable enterprise and small firm sector should consist of a combination of new firms and established growth firms, which compliment each other.

Therefore, to accommodate these trends, policy should encourage more individuals to consider self-employment in these growth sectors as a career option and as an alternative to the more traditional career patterns of paid employment. Since career choices are greatly influenced by the educational experience of the individual we consider that the role and influence of the educational system should be part of this policy agenda.

As educationalists we have a role to play in this. The education context of the individual should be examined to determine how it could be developed to encourage individuals to consider self-employment. Enterprising activity can be linked easily with certain disciplines, as we have demonstrated for ICT, to add value to the

competency base of the student. This will result in greater participation in self-employment in that discipline.

Conclusion

Entrepreneurship education in its broad sense has key strengths. However, sector specific needs, such as those required by the ICT industry, need to be accommodated to ensure graduates are equipped to contribute in different capacities to the strategic economic needs of a country. Given its importance to the Irish economy the focus in this paper has been on the ICT sector and the benefits of integrating entrepreneurship with ICT. The Process Framework for Entrepreneurship Education can be modified, as we demonstrated for the ICT sector, to facilitate the implementation of industry-specific entrepreneurship courses in other growth sectors. The potential for benefit to other participant groups lies in the ability of the educator to capture the specific characteristics and needs of these groups. Thus, the Framework supports them in the design of more relevant content, process and assessment aspects.

The development of such courses by us, the educationalists, will target graduates who will enter industry sectors where small firms are becoming increasingly important. This approach has the added advantage of the promotion of self-employment as an alternative career option for the graduate. Additionally the framework can be applied in a transferable manner to meet the needs of other sectors.

Ultimately, entrepreneurship education should be viewed as a flexible mechanism through which important knowledge, skills and competencies can be imparted to accommodate specific industry needs. Entrepreneurship education programmes should stimulate creativity and innovative thinking in education and develop a ‘‘can do’’ and “will do” mindset.

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